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skilled person would know that numerous variations are possible without departing from the scope of the claims.

We claim:

1. An ear plug comprising a shell with at least two electrodes adapted for measuring brain wave signals, said electrodes being connected via a connector to a processor for processing the measured signals, wherein:

contours of an outer surface of the ear plug are configured to individually match at least part of at least one of an ear canal and concha of a specific user such that said outer surface contours are configured to follow contours of said matched part,

the electrodes are configured to individually match said part such that a surface of each of said two electrodes to contact the concha or ear canal of the user is shaped to follow the contour of a part of the ear canal or concha to be contacted by said each electrode, and

the ear plug is made of a dimensionally stable material for identical positioning in the ear canal each time it is inserted.

2. The ear plug according to claim 1, wherein the processor is adapted for delivering a signal to the user.

3. The ear plug according to claim 1, wherein the processor is located external to the ear plug.

4. The ear plug according to claim 1, wherein the processor is located inside the ear plug.

5. An ear plug according to claim 1, wherein the connector comprises a conductive wiring drawn in or through said shell of the ear plug.

6. The ear plug according to claim 5, wherein said wiring is arranged to form at least part of one of the electrodes.

7. The ear plug according to claim 1, comprising a rivet extending between at least one of said two electrodes and said connector through at least a part of said shell of said ear plug in such a way that a part of said rivet is arranged flush with said surface of said shell.

8. The ear plug according to claim 7, wherein said part of said rivet is adapted to accommodate said at least one electrode.

9. The ear plug according to claim 1, comprising at least one recess in which at least one of said two electrodes is

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mounted, a bottom surface of the recess following the contours of the outer surface of the ear plug.

10. The ear plug according to claim 9, wherein the at least one electrode is held in the recess by the at least one electrode comprising at least one of: a close fit between the at least one electrode and the recess, at least one convexity on the at least one electrode corresponding to at least one concavity provided in the recess, and an adhesive.

11. The ear plug according to claim 9, wherein the at least one electrode is made of an electrically conductive flexible material.

12. The ear plug according to claim 1, wherein the electrodes are polarizable electrodes made of a material comprising at least one material selected from the group consisting of stainless steel, platinum-iridium, silver, titanium, platinum and tungsten.

13. The ear plug according to claim 1, wherein the electrodes are non-polarizable electrodes.

14. The ear plug according to claim 1, wherein each of the electrodes covers an area of at least 1 mm<sup>2</sup>, and no more than 30 mm<sup>2</sup>.

15. The ear plug according to claim 1, wherein said ear plug is a hearing aid ear plug having a sound presentation component for presenting sound from a hearing aid to said ear canal of said user.

16. The ear plug according to claim 1, wherein said processor is a processor for processing of said brain wave signals to provide information for detecting a medical condition of the user.

17. A hearing aid comprising a microphone, a hearing aid signal processor, and an ear plug for presenting processed sound from said hearing aid signal processor to an ear canal of a user, wherein said ear plug is an ear plug according to claim 1.

18. A method of producing an ear plug according to claim 1, the method comprising the steps of, tracing the shape of a part of at least one of the user's ear canal and concha, converting the traced shape into a digital form, and building the ear plug based on the digital form by means of a computer controlled production process.

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